Service Manual

Sharp

MODEL

GS-5500

SPECIFICATIONS

Tuner/Amplifier

Mains Input	110/200/220/240V, 50/60 c/s
Power Consumption	30 watts
Electrical Output	12W+12W Music Power
Load Impedance	8 ohms
Frequency Response	30–17,000 c/s
Tuning Range	FM 88–108 MC AM 525–1605 KC
Intermediate Frequency	FM 10.7 MC AM 455 KC
FM Antenna	300 ohms balanced
Antenna Input	
FM	Built-in External Conn.
AM	Ferrite Rod & External Conn.
Oscillator Drift	AFC on FM
Terminals & Jacks	DIN Record/pb Socket, Ch. L & R, Record Jacks, Stereo Headphone Jack
Dimensions	18 5/16″(W)×8 11/16″(H)×15 15/16″(D)(including player.)
Weight	26.5 lbs (including player.)

Loudspeaker Enclosure

Power Handling Capacity	12W Music Power
Volume	18 Litres
Frequency Range	60–17,000 c/s
Resonance Frequency	85 c/s
Cross-over Frequency	3000 c/s
Loudspeakers	16P-45A 6×12″ Low Note Pump HT-24K 3″ Horn Tweeter 2-way 4-speaker system
Dimensions	10″(W)×8 11/16″(D)×15 5/16″(H)
Weight	12 lbs.

Record Player

Type	4-speed Auto-return Stereo RPU-161
Turntable size	11″ (diameter)
Motor	4-pole Synchronous Motor
Arm	Auto-return Pipe Arm
Cartridge	High Compliance Ceramic Cartridge
Stylus	Diamond Stylus
Power Switch	Automatic shut-off system
Needle Force	6 grams
Sensitivity	300 mV at 5 cm/sec. per-channel
Mains Voltage	100 volts
Mains Frequency	50/60 c/s
Power Consumption	15 watts
Weight	6.2 lbs.
Dimensions	14 3/4″(W)×11 7/8″(D)×5 5/16″(H)

HAYAKAWA ELECTRIC CO., LTD.
OSAKA, JAPAN

TRANSISTOR & DIODE COMPLEMENT

Transistors

Q1	2SC-535B	FM RF Amplifier
Q2	2SC-535A	FM Converter
Q3, 4,	2SC-459A	FM IF Amplifier
Q5	2SC-459B	FM IF Amplifier
Q6	2SC-454B	AM Converter
Q7	2SC-454B	AM IF Amplifier
Q8	2SC-454A	AM IF Amplifier
Q9	2SC-281B	FM MPX Composite Amplifier
Q10	2SC-281B	FM MPX 19KC Amplifier
Q11	2SC-281B	FM MPX 38KC Amplifier
Q12, 13	2SC-281C	FM MPX Indicator
Q14, 15, Q16, 17	2SC-281C (Red Marked)	Preamplifier
Q18, 19	2SC-281B (Red Marked)	Driver Amplifier
Q20, 21 Q22, 23	2SB-361	Power Amplifier
Q24	2SC-281C	Ripple Filter

(Q14–Q24 are stereo pair transistors)

Diodes

D121	1N60	FM Limiter
D122	1N60	FM AGC
D123, 124	1N60	FM Detector
D1	SC-15	FM AFC
D101	1N60	AM AGC
D102	1N60	AM Detector
D201, 202, 203, 204, D205, 206, 207	1N34A	FM MPX
SR401, 402	DS-1P	Rectifier
SR403	SD-1Y	Rectifier

CIRCUIT DESCRIPTION

This unit incorporates an AM/FM stereo tuner/amplifier which is used in counjunction with a separate power source chassis. The power source chassis supplies DC voltages for the tuner/amplifier.

The AM tuner section of this chassis consists of a conventional oscillator converter and IF amplifier stages. The oscillator is a conventional collector to emitter feedback type utilizing a collector feedback coil. The amount of feedback is controlled by a tap in the secondary at which point the feedback voltage is coupled back to the emitter by a capacitor (C103, 0.02 mfd).

The IF transformer (4IF–765) is tuned to 455 KC. The output of this transformer coupled to the base of the 1st IF amplifier (Q7) through the secondary winding of the transformer. In the same way, the 2nd IF amplifier (Q8) amplifies the signal. The detector and AGC circuits are also conventional ones. The AGC voltage is fed to the base of the 1st IF amplifier (Q7) through R113 (270K ohm) and the secondary winding of the 1st AM IF transformer (4IF–765) to make the AGC performance effective.

The FM RF section contains two transistors which functions as an RF amplifier and oscillator converter. Common base type circuits are used throughout to assure high stability. The AFC varicap D1 (SC–15) is used to provide FM signal frequency stability when the AFC switch is in (push) position. When this switch is in off (pull) position, the voltage from the detector which is used as the AFC reference voltage is grounded, and so the varicap ceases to function.

The B+(plus) source for the RF IF deck is mainly obtained by dropping 25.5V source through a regulator (Q24), 15 and 600 ohm resistors in series.

The output of the FM detector is coupled to the base of the transistor (Q9) through a high frequency compensation circuitry which consists of R201 (22K ohm), C201 (250 pfd) and R202 (47K ohm), and compensates the roll-off characteristics to improve stereo channel separation.

If the signal is a monaural signal (L+R), it is amplified by the transistor (Q9) which serves two functions: as a 19KC amplifier when 19KC pilot signal is present, and as an ordinary C-R coupled amplifier in coupling of the monaural signal to the center tap of the 38KC transformer. Since this 38KC transformer is not grounded, the signals at the top and bottom will be in phase. The 4 demodulator diodes D204∼D209 (1N 34A), whose function is disabled by the foreward bias voltage obtained from R229 (6.8K ohm), R218 (2.7K ohm) and C220 (10 mfd), and passes the monaural signal with a minimum of distortion. Since the signal applied to the disabled diodes are of equal phase and amplitude, the output from each demodulator circuit will be equal and will represent a complete monaural signal. The FM monaural signal is then fed to the audio amplifier stage.

If the signal being transmitted is a composite stereo signal, it will include a 19KC pilot signal, the sidebands of the modulated 38KC suppressed carrier-signal (L−R) and a monaural signal (L+R). The transistor (Q9) amplifies composite FM stereo signal. The transformer (4L–936) is tuned to 19KC, so the 19KC pilot signal is amplified by the transistor (Q9) and fed to the 19KC amplifier (Q10) through the secondary winding of this transformer. The composite signal is amplified by the transistor (Q9) and extracted from the capacitor (C203, 10mfd). The trap (4L–937) is tuned to 67KC which is used as the SCA (Subsidiary Communications Authorization), such as background music or "store cast", so it must be trapped out to eliminate any possible interference in the FM stereo reception. Consequently, the L+R signal (50−15KC) and the L−R signal, which are sidebands of a presuppressed 38KC carrier and may range from 23KC to 53KC depending upon the modulating frequency, are coupled to the center tap of the 38KC transformer (4L–934) through the capacitor (C213, 10mfd).

The 19KC pilot signal is thus amplified by the

Please add following paragraph to the end of "POWER TRANSISTOR REPLACEMENT" (page 3)

Important

Afore mentioned matched-pair output transistors are devided into two groups; red-marked group and yellow-marked group as follows:

red-marked group .... pair No. 7 ～ No. 12
yellow-marked group .... pair No. 1 ～ No. 6

When replacement is necessary, the resistance value of R511, R513 or R512 R514 shall be

for red-marked group .... 27Ω ± 5%
※for yellow-marked group.............. 27Ω // 56Ω

※For yellow-marked group, another 56Ω±5% is added parallel to 27Ω and this 56Ω shall be ¼W type or more.
Red dot or yellow dot mark is on the top of the transistor case.
Please make a pair from the same pair-number transistor.

transistors (Q9 and Q10) and rectified by two diodes (D202, D203 1N34A), which double the 19KC signal and supply the bias voltage to the 38KC doubler (Q11). The current flows through collector and emitter (Q11) and the transistor (Q11) powers its function. At the same time, the current generates across emitter resistor (R213, 1K ohm), a bias voltage which makes the diode D201 (1N34A) at the emitter of Q10 foreward-biased, and connects the emitter (Q10) to the ground through the capacitor (C221, 10 mfd.). Thus the amplitude gain of the transistor (Q10) greatly increases. The 38KC signal also increases at the collector (Q11).

At the same time, this voltage neutralizes the forward-bias effect on the 4 detector diodes (D204~D207 1N34A) and actuates these diodes to operate as a stereo demodulator, which also eliminates distortion. We call this circuitry the automatic FM mono-stereo switching circuit.

The 38KC transformer is used to reinsert the previously suppressed 38KC carrier frequency back into the L−R signal. The 38KC reinserted subcarrier appears 180 degrees out of phase at the top and bottom of the secondary winding of (4L-934), when mixed with a composite signal. The right channel modulation appears on the top of the envelope, and the left channel on the bottom. The diodes are connected in such a manner that one series pair of diodes detects the top envelope and another series pair detects the bottom, depending on the polarity of the 38KC signal. Any 38KC carrier which has passed through the diodes is filtered out in the parallel-T filter network PRC-371.

The bias voltage across the emitter resistor R213 (1K ohm) of Q11 also actuates the stereo indicator circuitry (Q12, Q13, PL-502) and causes the transitor (Q12) to conduct the current which flows through indicator (PL-502). The transistor (Q13) improves this switching action.

In the case of a monaural signal the output from each demodulator circuit is connected to its respective channel in the audio frequency amplifier stage.

Transitors (Q14, Q15) are used for obtaining high input impedance and enough recording output levels for the TRC Recording Terminals and DIN record/pb socket.

Tone controls are conventional C-R type and are connected to the volume and balance controls. Transistors (Q16, Q17) are directly coupled to transistors (Q18, Q19) to improve the phase characteristics of the feedback loop and they also decreases the noise level.

Transistors (Q18, Q19) are driver amplifiers, AC coupled to the input transformers which provide opposite phase signals to the output transistors. The output transistors function as AB class single ended push pull output-transformerless amplifiers.

CHASSIS REMOVAL

1. Pull off the power source plug from its soket on the power source chassis.
2. Slightly lift up the turn table and pull off the phono and the player AC plugs from their sockets.
3. Pull off the 7 operation knobs located on the front of the cabinet.
4. Disconnect the speaker leadwires and the external antenna feeder wire from their terminals on the back of the cabinet.
5. Remove the cabinet back cover. Don't break or disconnect the leadwires attatched to the ext. speaker and the ext. antenna terminals.
6. Remove the chassis retaining screws on the bottom of the cabinet and carefully lift out the power source chassis and the main chassis.

POWER TRANSISTOR REPLACEMENT

The power transistors used in the output stages are matched pairs. They have been selected so that they have very similar current gain and trans-conductance characteristics. This matching is necessary in order to assure optimum performance, but is such that if a transistor fails in either channel, another transistor in that channel must also be replaced. Transistors are supplied only in matched pairs for replacement.

The transistors diffuse a large amount of heat which must be carried off in order to prevent damage to the transistors, the collectors of which are thermally connected to the heat sink by means of electrical insulators to avoid grounding. The insulator is a very thin plastic film mounted between the transistor case (collector) and the heat sink. A layer of silicon grease which is a good conductor of heat is applied to both sides of the insulator in order to improve heat sink operation. When the power transistors are replaced the spacer film must be re-installed and a new layer of grease applied to both sides. Care should be taken, lest conductive dust such as metal particles should break through the insulator films.

CHASSIS LAYOUT

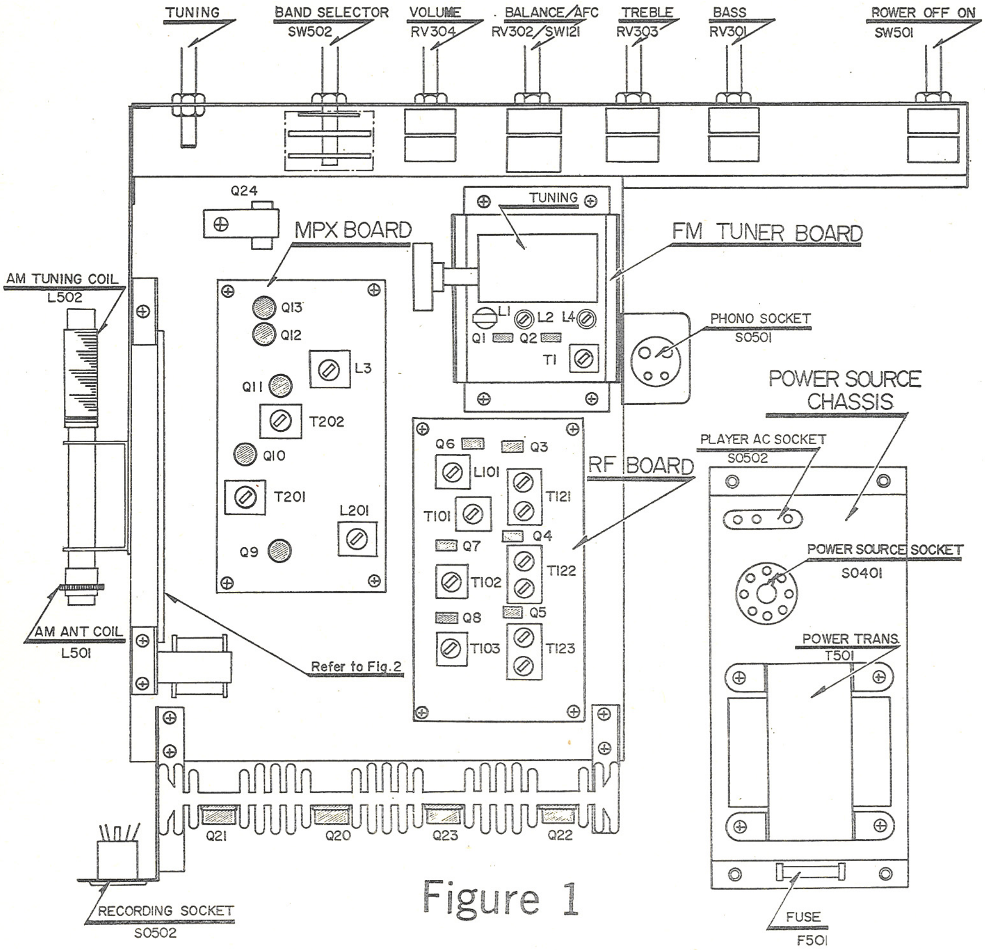

TUNING
BAND SELECTOR SW502
VOLUME RV304
BALANCE/AFC RV302/SW121
TREBLE RV303
BASS RV301
ROWER OFF ON SW501
Q24
MPX BOARD
TUNING
FM TUNER BOARD
AM TUNING COIL L502
Q13
Q12
L3
Q11
T202
Q10
T201
L201
Q9
L1
L2
L4
Q1
Q2
T1
PHONO SOCKET S0501
POWER SOURCE CHASSIS
PLAYER AC SOCKET S0502
Q6
Q3
L101
T121
T101
Q4
Q7
T122
T102
Q8
Q5
T103
T123
RF BOARD
POWER SOURCE SOCKET S0401
POWER TRANS. T501
AM ANT COIL L501
Refer to Fig. 2
Q21
Q20
Q23
Q22
RECORDING SOCKET S0502
FUSE F501

Figure 1

AF PC BOARD TOP VIEW

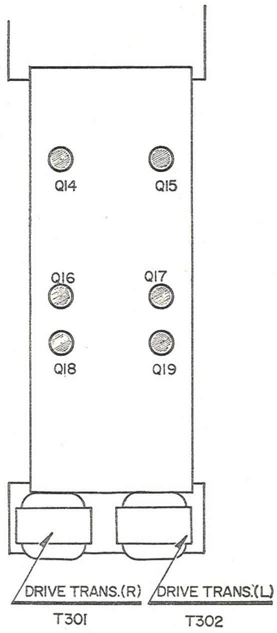

Q14
Q15
Q16
Q17
Q18
Q19
DRIVE TRANS.(R) T301
DRIVE TRANS.(L) T302

Figure 2

DIAL CORD STRINGING

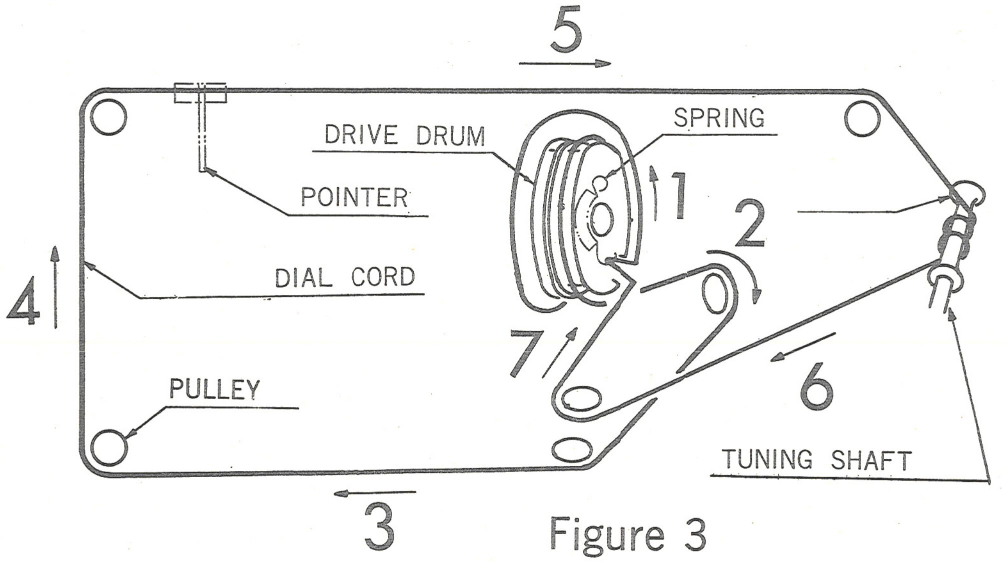
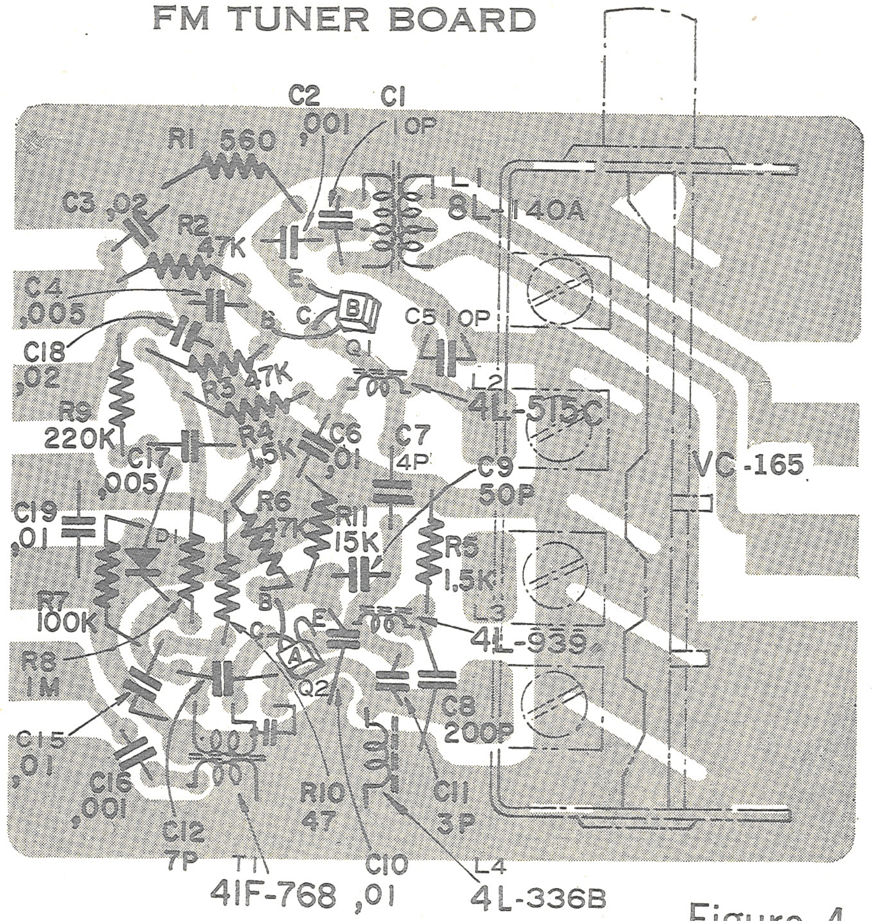

5
DRIVE DRUM
SPRING
POINTER
1
2
DIAL CORD
4
7
6
PULLEY
TUNING SHAFT
3

Figure 3

Notes: Tuning capacitor is positioned at maximum capacity.
Overall length of dial cord is 21 1/16″.

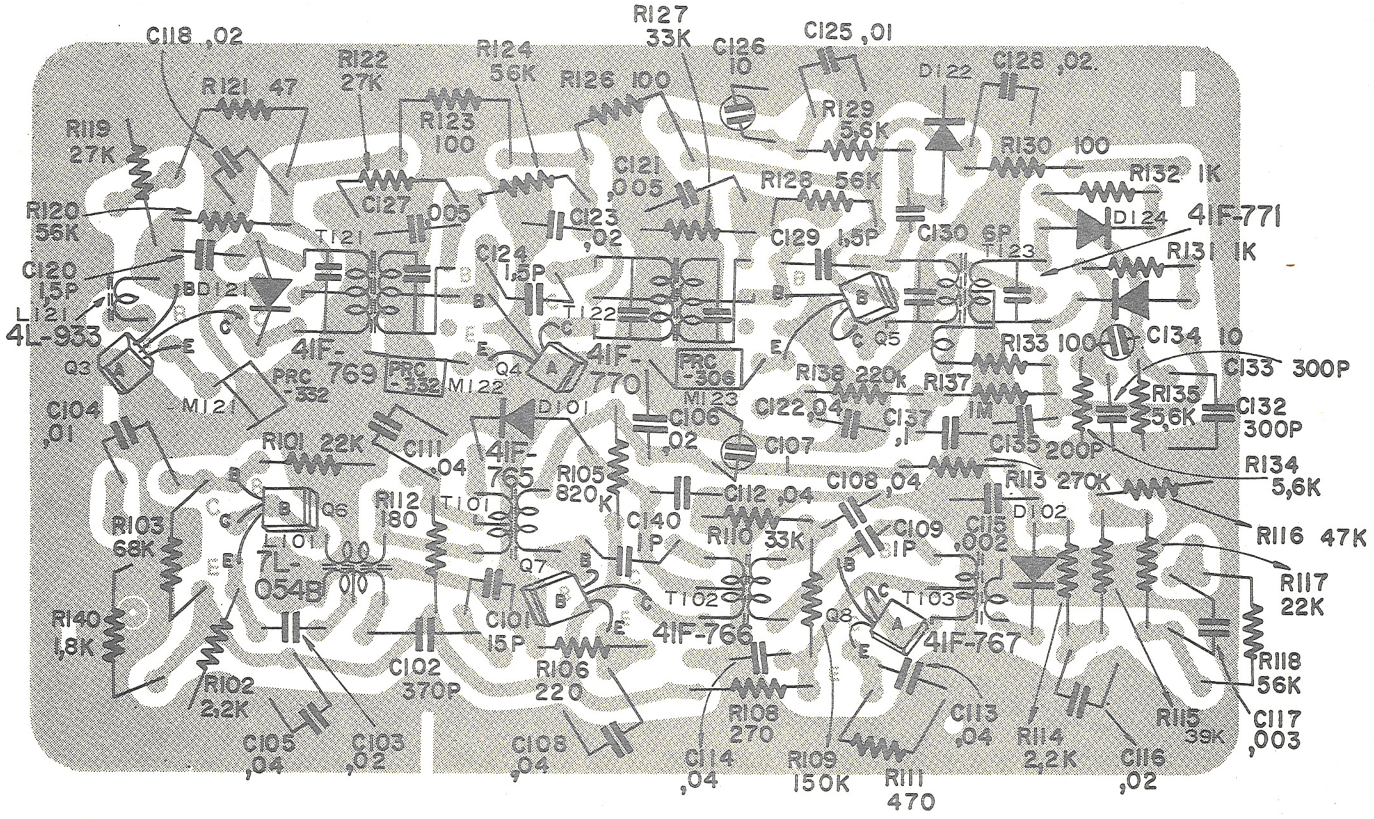
FM TUNER BOARD



R1 560
C2 ,001
C1 10P
L1 8L-140A
C3 ,02
R2 47K
C4 ,005
C18 ,02
C5 10P
Q1
L2 4L-515C
R9 220K
R3 47K
R4 1,5K
C6 ,01
C7 4P
C9 50P
VC-165
C17 ,005
C19 ,01
D1
R6 47K
R11 15K
R5 1,5K
R7 100K
R8 1M
Q2
L3 4L-939
C8 200P
C15 ,01
C16 ,001
C12 7P
T1 4IF-768
R10 47
C10 ,01
C11 3P
L4 4L-336B

Figure 4

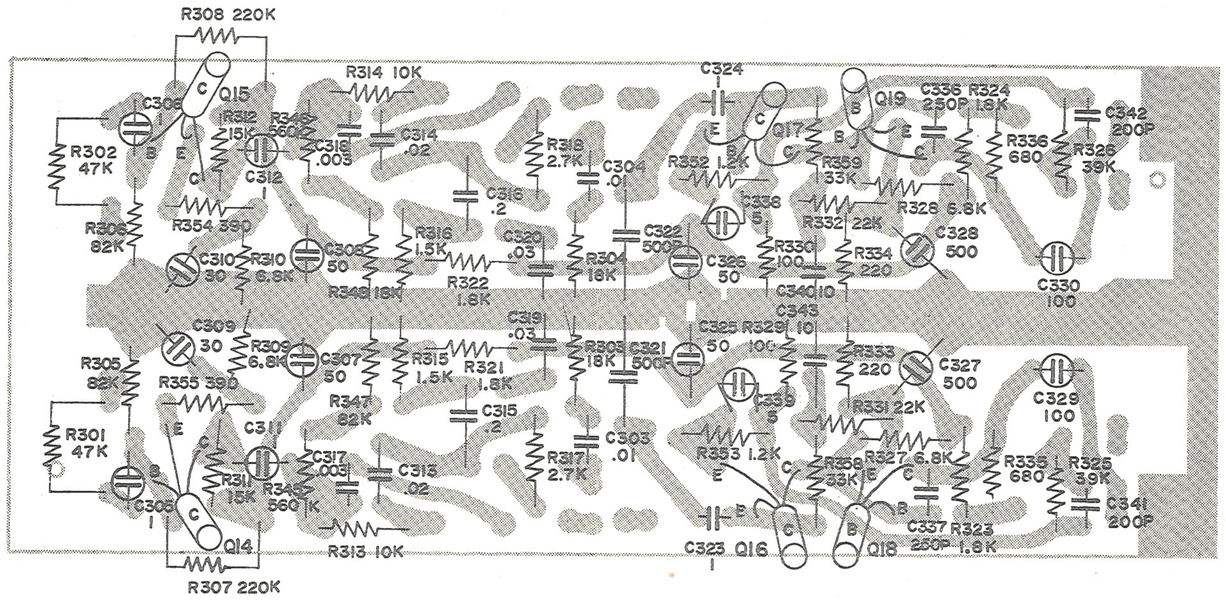
RF BOARD



C118 ,02
R121 47
R122 27K
R124 56K
R127 33K
C126 10
C125 ,01
R119 27K
R123 100
R126 100
D122
C128 ,02
R120 56K
C127 ,005
C121 ,005
R129 5,6K
R130 100
C120 1,5P
T121
C123 ,02
R128 56K
R132 1K
L121 4L-933
BD121
C124 1,5P
T122
C129 1,5P
C130 6P
D124
4IF-771
Q3
4IF-769
PRC -332
M121
Q4
4IF-770
PRC -306
M123
Q5
T123
R131 1K
C104 ,01
M122
D101
R138 220K
R137
R133 100
C134 10
C133 300P
R101 22K
C111 ,04
4IF-765
R105 820K
C106 ,02
C122 ,04
C137 ,1
1M
R135 5,6K
C132 300P
Q6
R112 180
T101
C140 1P
C112 ,04
C107
C108 ,04
C135 200P
R113 270K
R134 5,6K
R103 68K
L101 7L-054B
Q7
R110 33K
C109 1P
C115 ,002
D102
R116 47K
R140 1,8K
C101 15P
T102 4IF-766
Q8
T103 4IF-767
R117 22K
R102 2,2K
C102 370P
R106 220
R108 270
C113 ,04
R114 2,2K
R115 39K
R118 56K
C117 ,003
C105 ,04
C103 ,02
C108 ,04
C114 ,04
R109 150K
R111 470
C116 ,02

Figure 5

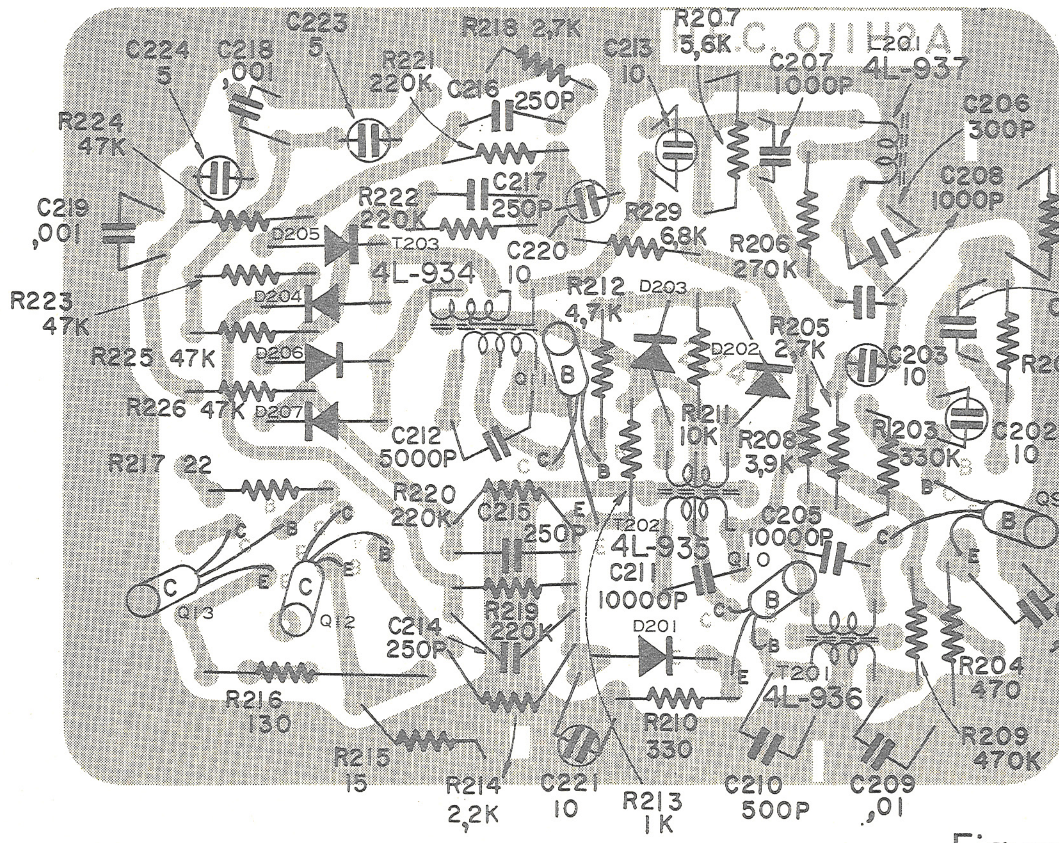
AF BOARD



R308 220K
R314 10K
C324
C336 250P
R324 1,8K
C342 200P
Q15
C306
R312 15K
R346 560
C316 .003
C314 .02
R318 2.7K
C304 .01
Q17
Q19
R336 680
R326 39K
R302 47K
C312
C318 .2
R352 1.2K
R339 33K
R306 82K
R354 390
C310 30
R310 6.8K
C308 50
R316 1.5K
R322 1.8K
C320 .03
R304 18K
C322 500P
C326 50
C338 5
R332 22K
R330 100
R334 220
R328 6.8K
C328 500
C330 100
R348 18K
C340 10
C343 10
C309 30
R309 6.8K
C319 .03
R303 18K
C321 500P
C325 50
R329 100
R333 220
C327 500
R305 82K
R355 390
C307 50
R315 1.5K
R321 1.8K
R331 22K
C329 100
R347 82K
C315 .2
C339 5
R301 47K
C311
C317 .003
C313 .02
R317 2.7K
C303 .01
R353 1.2K
R358 33K
R327 6.8K
R335 680
R325 39K
C305 1
R311 15K
R345 560
C341 200P
Q14
R313 10K
C323 1
Q16
Q18
C337 250P
R323 1.8K
R307 220K

Figure 6

MPX BOARD



C224 5
C223 5
C218 ,001
R218 2,7K
R207 5,6K
C213 10
C207 1000P
L201 4L-937
R221 220K
C216 250P
R224 47K
C206 300P
C219 ,001
C208 1000P
R202 47K
R222 220K
C217 250P
R229 6,8K
R206 270K
D205
T203 4L-934
C220 10
R223 47K
D204
R212 4,7K
D203
R205 2,7K
C201 250P
R225 47K
D206
Q11
D202
C203 10
R201 22K
R226 47K
D207
C212 5000P
R211 10K
R208 3,9K
R203 330K
C202 10
R217 22
R220 220K
C215 250P
T202 4L-935
C205 10000P
Q9
C211 10000P
Q10
Q13
Q12
C214 250P
R219 220K
D201
C204 ,005
R216 130
R210 330
T201 4L-936
R204 470
R215 15
R214 2,2K
C221 10
R213 1K
C210 500P
C209 ,01
R209 470K

Figure 7

SCHEMATIC DIAGRAM

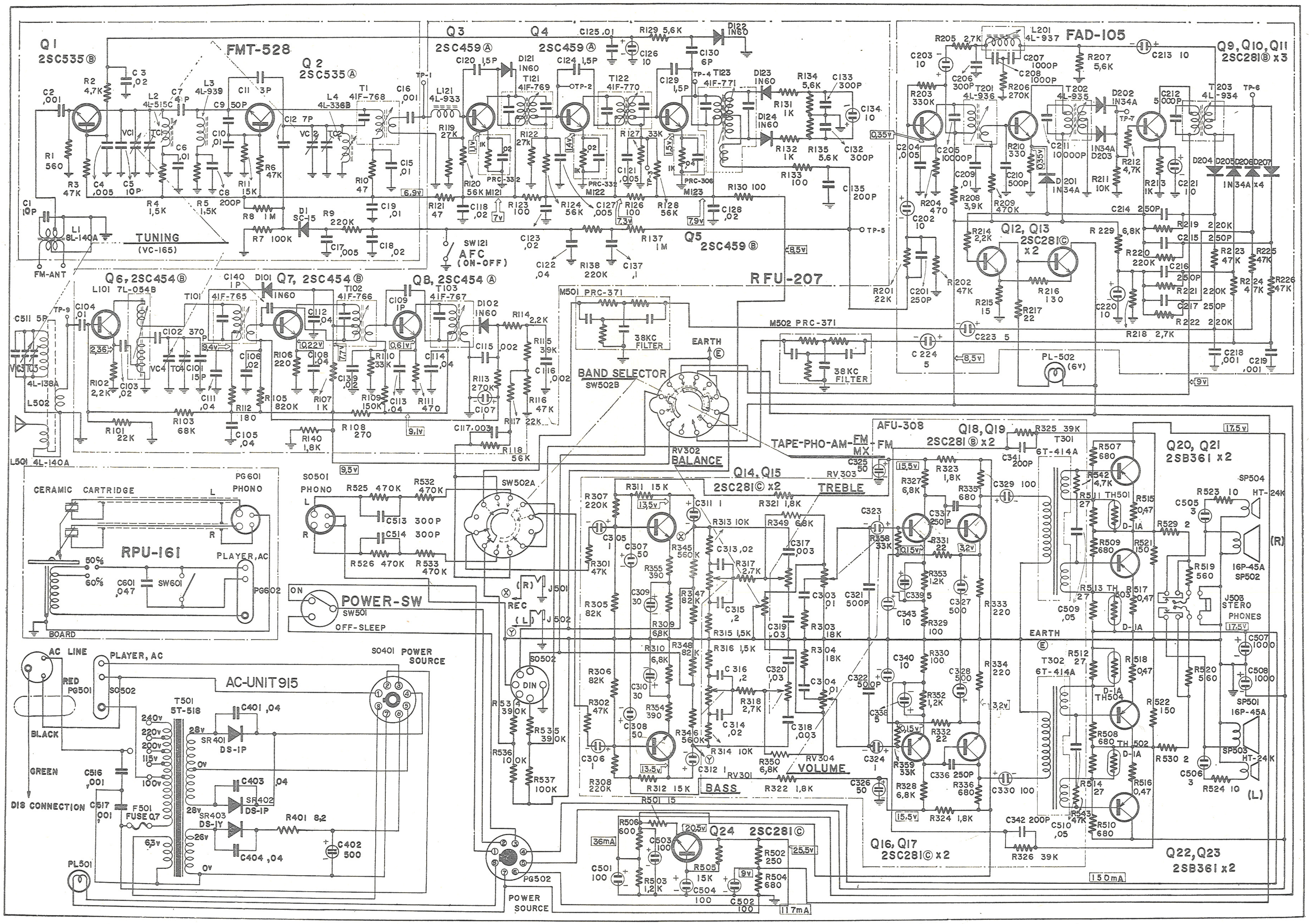

FMT-528
Q1 2SC535Ⓑ
Q2 2SC535Ⓐ
Q3 2SC459Ⓐ
Q4 2SC459Ⓐ
Q5 2SC459Ⓑ
TUNING (VC-165)
FM-ANT
SW121 AFC (ON-OFF)
RFU-207
FAD-105
Q9, Q10, Q11 2SC281Ⓑ x3
Q12, Q13 2SC281Ⓒ x2
PL-502 (6V)
Q6, 2SC454Ⓑ
Q7, 2SC454Ⓑ
Q8, 2SC454Ⓐ
M501 PRC-371 38KC FILTER
M502 PRC-371 38KC FILTER
EARTH
BAND SELECTOR SW502B
TAPE-PHO-AM-FM MX FM
AFU-308
Q18, Q19 2SC281Ⓑ x2
Q20, Q21 2SB361 x2
Q14, Q15 2SC281Ⓒ x2
RV302 BALANCE
RV303 TREBLE
RV304 VOLUME
RV301 BASS
Q16, Q17 2SC281Ⓒ x2
Q22, Q23 2SB361 x2
Q24 2SC281Ⓒ
CERAMIC CARTRIDGE
PG601 PHONO
RPU-161
PLAYER, AC
PG602
BOARD
S0501 PHONO
SW502A
POWER-SW SW501 OFF-SLEEP
REC J501 J502
S0502 DIN
AC LINE
PLAYER, AC
PG501 S0502
RED BLACK GREEN
DIS CONNECTION
AC-UNIT 915
T501 5T-518
S0401 POWER SOURCE
PG502 POWER SOURCE
PL501
SP504 HT-24K
SP502 16P-45A
J503 STEREO PHONES
SP501 16P-45A
SP503 HT-24K
(R)
(L)
T301 6T-414A
T302 6T-414A
150mA
117mA
36mA

Figure 8

ALIGNMENT INSTRUCTIONS

Alignment is an exacting procedure and should be undertaken only when necessary. If alignment of AM and FM is required, either section may be done first. The FM stereo section, however, should be done only when FM monaural section is sure to be properly adjusted.

Required Equipment

1. Signal generator with a frequency range of at least 455KC to 1670KC: AM
2. Signal generator with a frequency range of at least 86MC to 108.5MC: FM
3. Signal generator with a frequency range of at least 10.7MC ±0.5MC: FM
4. Vacuum tube voltmeter (AC-VTVM)
5. Sweep signal generator with a sweep range of at least 500KC and center frequency of 10.7MC with at least a 10.7MC marker. (Ext. marker may be used)
6. Oscilloscope with a wide range amplifier of appoximately 100KC,
7. Test loop, a coil of any size wire, one turn or more.
8. FM stereo signal generator.
9. Audio signal generator with a frequency range of 20c/s to 100KC.

Notes: Allow the set at least five minutes to warm up before attempting alignment. During alignment keep the signal generator output at the lowest level that will maintain a usable output from the set, except FM stereo signal generator.

Ground connection of signal generator.................................... chassis ground
Generator modulation (AM) 30%, 400c/s
Generator modulation (FM).. 22.5KC
Generator modulation (FM stereo) .... Ch. L or Ch. R 12KC

ALIGNMENT PROCEDURE

AM ALIGNMENT

Signal Generator		Dial Pointer Setting	Selector Setting	Meter Connection	Adjustment	Remarks
Connection	Frequency					
Radiated or TP-9 as small as possible	455 KC (SG or Sweep)	High end of Dial	AM	Across Output Load	T103(4IF-767) T102(4IF-766) T101(4IF-765) respectively	Volume control max. Get peak output point. Repeat 2 or 3 times.
Radiated Signal as small as possible	515 KC Modulated	Low end of Dial	AM	Across Output Load	L101(7L-054B)	Same as above.
Radiated Signal as small as possible	1650 KC Modulated	High end of Dial	AM	Across Output Load	TC4(Oscillator Trimmer)	Same as above.
Radiated Signal as small as possible	1400 KC Modulated	1400 KC	AM	Across Output Load	TC3(Tuning Trimmer)	Same as above.
Radiated Signal as small as possible	600 KC Modulated	600 KC	AM	Across Output Load	L502(4L-138A)	Same as above.

FM IF ALIGNMENT

Sweep Generator		Dial pointer Setting	Selector Setting	Scope Connection	Adjustment	Remarks
Connection	Frequency					
Thru 0.01 mfd to TP-2	10.7 MC ±500 KC	High end of Dial	FM MONO	TP-3	T122(4IF-770)	Maximum amplitude keeping 10.7MC marker centered
Thru 0.01 mfd to TP-1	10.7 MC ±500 KC High Level	High end of Dial	FM MONO	TP-3	T121(4IF-769) Secondary Winding	Same as above.
Thru 0.01 mfd to TP-1	10.7 MC ±500 KC as small as possible	High end of Dial	FM MONO	TP-3	T121(4IF-769) Primary Winding	Same as above.
FM-ANT	10.7 MC ±500 KC	High end of Dial	FM MONO	TP-3	T1(4IF-768)	Same as above.
TP-4 and FM-ANT respectively	10.7 MC ±500 KC	High end of Dial	FM MONO	TP-5	T123(4IF-771)	Adjust for maximum amplitude and symmetry of "S" curve

Note: Before proceeding with FM IF alignment detune primary winding of 4IF-771.

FM RF ALIGNMENT

Signal Generator		Dial Pointer Setting	Selector Setting	Meter Connection	Adjustment	Remarks
Connection	Frequency					
FM-ANT Terminal	86.5 MC Modulated	Low end of Dial	FM MONO	Across Output Load	L4(4L-336B)	Volume Control Max. Get peak output point. Repeat 2 or 3 times.
FM-ANT Terminal	108.5 MC Modulated	High end of Dial	FM MONO	Across Output Load	TC2(Oscillator Trimmer)	Same as above.
FM-ANT Terminal	90 MC Modulated	90 MC	FM MONO	Across Output Load	L2(4L-515C)	Same as above.
FM-ANT Terminal	106 MC Modulated	106 MC	FM MONO	Across Output Load	TC1(Tuning Trimmer)	Same as above.

FM STEREO ALIGNMENT

Signal Generator		Tuning Frequency	Selector Setting	Scope Connection	Adjustment	Remarks
Connection	Mod. Frequency					
FM-ANT	67 KC 10% Mod.	98 MC	FM auto	Across R207 5.6K ohm	L201(4L-937)	Get the minimum point.
FM-ANT	19 KC Mod. level as small as possible	98 MC	FM auto	TP-7 Sensitivity Max.	T202(4L-935) T201(4L-936) Respectively	Get the maximum point. Repeat 2 or 3 times.
FM-ANT	19 KC 10% Mod.	98 MC	FM auto	TP-6	T203(4L-934)	Get the maximum point.
Adjust the 19KC Modulation from 0 to 10% to check the on-off action of stereo indication circuit.						
FM-ANT	1000 c/s Ch. L only	98 MC	FM auto	Across Ch. L Output Load	T203(Readjust 4L-934)	Get the maximum output point.
FM-ANT	1000 c/s Ch. L only	98 MC	FM auto	Across Ch. R Output Load	T203(Readjust 4L-934)	Same as above.
FM-ANT	1000 c/s Ch. R only	98 MC	FM auto	Across Ch. R Output Load	T203(Readjust 4L-934)	Same as above.
Get the best adjustment point of 4L-934 repeating 2 or 3 times.						

Note: FM ST. Signal Generator output level shall be 60 dB.

TROUBLESHOOTING IN THE STEREO SET

Symptoms and probable causes

1. No sound no light ....
   a) Defective switches
   b) Loose plug, wire or cold solder joint
   c) Open transformer
2. Transformer overheats ....
   a) Unit not wired for correct voltage
   b) Shorted winding in the transformer
   c) Shorted rectifier diode
   d) Shorted filter capacitor
   e) DC-source to chassis short
   f) Collector-to-emitter short both Q 22 and Q 23 or Q 24, Q 25
3. No sound with pilot lamp on
   a) Open rectifier diode
   b) Cold solder joint for DC voltage supply circuit wiring
   c) Defect on speaker or wiring
   d) Shorted filter capacitor or DC voltage supply circuit through the resistor R501 (4.7 ohm)
4. Sound on single channel only
   a) Defect on power transistor
   b) Defect on audio amplifier stages on another channel, cold solder joint, transistor short or open circuited, especially on inter-stage parts
5. Distorted sound
   a) Improper transistor operation, check each voltage shown in the schematic drawing
   b) Collector-to-heatsink short-circuited on power transistor
   c) Transistor open or short-circuited
   d) Large voltage differential from that shown in the schematic drawing, especially on emitters
6. No sound when the selector is in tape position and a tape recorder is connected
   a) Defective tape recorder
   b) Defective audio stage or input connections
7. No Sound when the selector is in phono position and record player is connected
   a) Defective player cartridge or wiring
   b) Defective audio stages or input connections
8. No sound when the selector is in AM position
   a) Defective AM tuner/IF part or its interconnections; transistors, IF transformers, soldering or wiring
9. No sound when the selector is in FM position
   a) Defective FM tuner/IF part or inter-connection; transistors, IF transformers, soldering or wiring
10. No separation on FM stereo reception
    a) Defective 4L-936, 4L-935, D202, D203 (1N34A), 4L-934, Q 8 or Q 9. In order to check the 19KC action, 19KC audio signal from signal generator should be connected through .01mfd to the base of Tr 7 and Tr 8.
    b) Readjustment is necessary on 4L-934, 4L-935 or 4L-936.
11. Noise on AM reception
    a) Put noise filter on the AC-line.

TROUBLESHOOTING IN THE RECORD PLAYER

Trouble	Cause	Solution
Pick-up stops moving after playing through the record.	1. Defective pick-up; pick-up shaft properly settled in its base. 2. Slide plate ① doesn't move smoothly. 3. Flawed record.	1. Remove and examine the pick-up, replace if necessary. 2. Grease contact parts. 3. Move the pick-up with your hand.
Pick-up doesn't return or returns improperly.	1. Pick-up stops halfway through the record. 2. Defective turntable; insufficient or faulty projection on bottom. 3. Motor runs awry, turntable stops turning. 4. Pick-up returns too early or too late.	1. Refer to above. 2. Replace the turntable. 3. Remove oil, dust or other foreign material from the idler, the capstan and the inner edge of the turntable. Readjust movement between idler and capstan. 4. Readjust return control screw ②; to advance, turn screw clockwise, to delay, turn counterclockwise.
Pick-up doesn't returns even when the auto-cut switch lever is turned.	1. Slide plate ① fails to push the gear bracket.	1. Readjust slide plate ① or the gear bracket so as to move correctly.
Power fails to shut off even after the pick-up returns to the pick-up stand.	1. Switch projection insufficiently or excessively pressed. 2. Defective switch ③.	1. Readjust position of the switch ③ by unfastening the switch retaining screws ④. 2. Replace the switch ③.

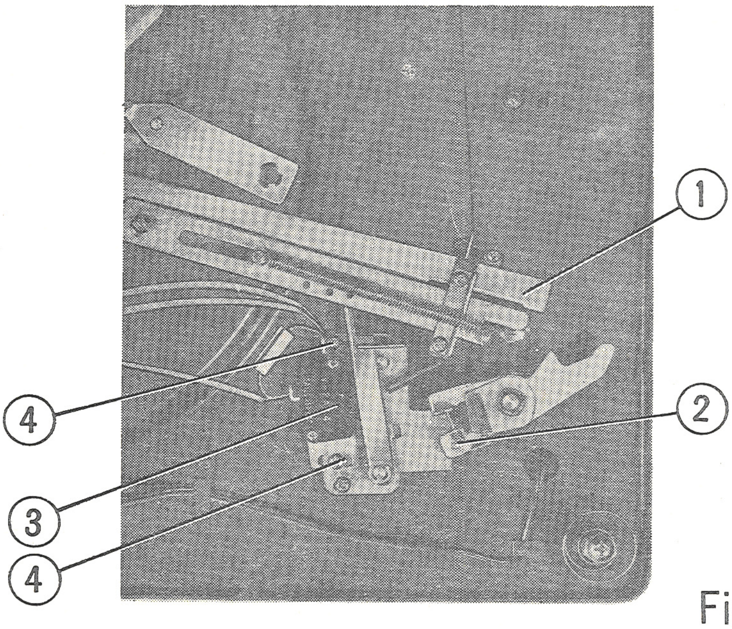


Figure 9

PARTS LIST

RESISTORS

REF. NO.	PART NO.	DESCRIPTION
R_{1}	1/4M-560K	1/4W, Carbon, ±10%, 560 ohm
R_{2}	1/4M-4.7KK	1/4W, Carbon, ±10%, 4.7K ohm
R_{3}	1/4M-47KK	1/4W, Carbon, ±10%, 47K ohm
R_{4}, R_{5}	1/4M-1.5KK	1/4W, Carbon, ±10%, 1.5K ohm
R_{6}	1/4M-47KK	1/4W, Carbon, ±10%, 47K ohm
R_{7}	1/4M-100KK	1/4W, Carbon, ±10%, 100K ohm
R_{8}	1/4M-1MK	1/4W, Carbon, ±10%, 1M ohm
R_{9}	1/4M-220KK	1/4W, Carbon, ±10%, 220K ohm
R_{10}	1/4M-47K	1/4W, Carbon, ±10%, 47 ohm
R_{11}	1/4M-15KK	1/4W, Carbon, ±10%, 15K ohm
R_{101},R_{117}	1/4M-22KK	1/4W, Carbon, ±10%, 22K ohm
R_{102},R_{114}	1/4M-2.2KK	1/4W, Carbon, ±10%, 2.2K ohm
R_{103}	1/4M-68KK	1/4W, Carbon, ±10%, 68K ohm
R_{105}	1/4M-820KK	1/4W, Carbon, ±10%, 820K ohm
R_{106}	1/4M-220K	1/4W, Carbon, ±10%, 220 ohm
R_{107},R_{131}, R_{132}	1/4M-1KK	1/4W, Carbon, ±10%, 1K ohm
R_{108}	1/4M-270K	1/4W, Carbon, ±10%, 270 ohm
R_{109}	1/4M-150KK	1/4W, Carbon, ±10%, 150K ohm
R_{110},R_{127}	1/4M-33KK	1/4W, Carbon, ±10%, 33K ohm
R_{111}	1/4M-470K	1/4W, Carbon, ±10%, 470 ohm
R_{112}	1/4M-180K	1/4W, Carbon, ±10%, 180 ohm
R_{113}	1/4M-270KK	1/4W, Carbon, ±10%, 720K ohm
R_{115}	1/4M-39KK	1/4W, Carbon, ±10%, 39K ohm
R_{116}	1/4M-47KK	1/4W, Carbon, ±10%, 47K ohm
R_{118},R_{120}, R_{124},R_{128}	1/4M-56KK	1/4W, Carbon, ±10%, 56K ohm
R_{119},R_{122}	1/4M-27KK	1/4W, Carbon, ±10%, 27K ohm
R_{121}	1/4M-47K	1/4W, Carbon, ±10%, 47 ohm
R_{123},R_{126}, R_{130},R_{133}	1/4M-100K	1/4W, Carbon, ±10%, 100 ohm
R_{129},R_{134}, R_{135}	1/4M-5.6KK	1/4W, Carbon, ±10%, 5.6K ohm
R_{137}	1/4M-1MK	1/4W, Carbon, ±10%, 1M ohm
R_{138}	1/4M-220KK	1/4W, Carbon, ±10%, 220K ohm
R_{140}	1/4M-1.8KK	1/4W, Carbon, ±10%, 1.8K ohm
R_{201}	1/4M-22KK	1/4W, Carbon, ±10%, 22K ohm
R_{202},R_{223}, R_{224},R_{225}, R_{226}	1/4M-47KK	1/4W, Carbon, ±10%, 47K ohm
R_{203}	1/4M-330KK	1/4W, Carbon, ±10%, 330K ohm
R_{204},R_{210}	1/4M-470K	1/4W, Carbon, ±10%, 470 ohm
R_{205},R_{218}	1/4M-2.7KK	1/4W, Carbon, ±10%, 2.7K ohm
R_{206}	1/4M-270KK	1/4W, Carbon, ±10%, 270K ohm
R_{207}	1/4M-5.6KK	1/4W, Carbon, ±10%, 5.6K ohm
R_{208}	1/4M-3.9KK	1/4W, Carbon, ±10%, 3.9K ohm
R_{209}	1/4M-470KK	1/4W, Carbon, ±10%, 470K ohm
R_{210}	1/4M-330K	1/4W, Carbon, ±10%, 330 ohm
R_{211}	1/4M-10KK	1/4W, Carbon, ±10%, 10K ohm
R_{212}	1/4M-4.7KK	1/4W, Carbon, ±10%, 4.7K ohm
R_{213}	1/4M-1KK	1/4W, Carbon, ±10%, 1K ohm
R_{214}	1/4M-2.2KK	1/4W, Carbon, ±10%, 2.2K ohm
R_{215}	1/4M-15K	1/4W, Carbon, ±10%, 15 ohm
R_{216}	1L-130K	1W, Carbon, ±10%, 130 ohm
R_{217}	1/4M-22K	1/4W, Carbon, ±10%, 22 ohm
R_{219},R_{220}, R_{221},R_{222}	1/4M-220KK	1/4W, Carbon, ±10%, 220K ohm
R_{229}	1/4M-6.8KK	1/4W, Carbon, ±10%, 6.8K ohm
R_{301},R_{302}	1/4M-47KK	1/4W, Carbon, ±10%, 47K ohm
R_{303},R_{304}	1/4M-18KK	1/4W, Carbon, ±10%, 18K ohm
R_{327},R_{328}	1/4M-6.8KK	1/4W, Carbon, ±10%, 6.8K ohm
R_{305},R_{306}	1/4M-82KK	1/4W, Carbon, ±10%, 82K ohm
R_{307},R_{308}	1/4M-220KK	1/4W, Carbon, ±10%, 220K ohm
R_{309},R_{310}	1/4M-6.8KK	1/4W, Carbon, ±10%, 6.8K ohm
R_{311},R_{312},	1/4M-15KK	1/4W, Carbon, ±10%, 15K ohm
R_{313},R_{314}	1/4M-10KK	1/4W, Carbon, ±10%, 10K ohm
R_{315},R_{316}	1/4M-1.5KK	1/4W, Carbon, ±10%, 1.5K ohm
R_{317},R_{318}	1/4M-2.7KK	1/4W, Carbon, ±10%, 2.7K ohm
R_{321},R_{322}	1/4M-1.8KK	1/4W, Carbon, ±10%, 1.8K ohm
R_{323},R_{324}	1/4M-1.8KK	1/4W, Carbon, ±10%, 1.8K ohm
R_{325},R_{326}	1/4M-39KK	1/4W, Carbon, ±10%, 39K ohm
R_{329},R_{330}	1/4M-100K	1/4W, Carbon, ±10%, 100 ohm
R_{331},R_{332}	1/4M-22KK	1/4W, Carbon, ±10%, 22K ohm
R_{333},R_{334}	1/4M-220K	1/4W, Carbon, ±10%, 220 ohm
R_{335},R_{336}	1/4M-680K	1/4W, Carbon, ±10%, 680 ohm
R_{345},R_{346}	1/4M-560KK	1/4W, Carbon, ±10%, 560K ohm
R_{347},R_{348}	1/4M-82KK	1/4W, Carbon, ±10%, 82K ohm
R_{349},R_{350}	1/4M-6.8KK	1/4W, Carbon, ±10%, 6.8K ohm
R_{352},R_{353}	1/4M-1.2KK	1/4W, Carbon, ±10%, 1.2K ohm
R_{354},R_{355}	1/4M-390K	1/4W, Carbon, ±10%, 390 ohm
R_{358},R_{359}	1/4M-33KK	1/4W, Carbon, ±10%, 33K ohm
R_{401}	1L-8.2K	1W, Carbon, ±10%, 8.2 ohm
R_{501}	1L-15K	1W, Carbon, ±10%, 15 ohm
R_{502}	2L-250K	2W, Carbon, ±10%, 250 ohm
R_{503}	1/2M-1.2KK	1/2W, Carbon, ±10%, 1.2K ohm
R_{504}	1/2M-680K	1/2W, Carbon, ±10%, 680 ohm
R_{505}	1/4M-15KK	1/4W, Carbon, ±10%, 15K ohm
R_{506}	1L-600K	1W, Carbon, ±10%, 600 ohm
R_{507},R_{508}, R_{509},R_{510}	1/2M-680 J	1/2W, Carbon, ±5%, 680 ohm
R_{511},R_{512}, R_{513},R_{514}	1/2M-27 J	1/2W, Carbon, ±5%, 27 ohm
R_{515},R_{516}, R_{517},R_{518}	1LL-0.47K	1W, Carbon, ±10%, 0.47 ohm
R_{519},R_{520}	1/2M-560K	1/2W, Carbon, ±10%, 560 ohm
R_{521},R_{522}	1/2M-150K	1/2W, Carbon, ±10%, 150 ohm
R_{523},R_{524}	3L-10K	3W, Carbon, ±10%, 10 ohm
R_{525},R_{526}, R_{532},R_{533}	1/2M-470KK	1/2W, Carbon, ±10%, 470K ohm
R_{529},R_{530}	1L-2K	1W, Carbon, ±10%, 2 ohm
R_{534},R_{535}	1/4M-390KK	1/4W, Carbon, ±10%, 390K ohm
R_{536},R_{537}	1/4M-100KK	1/4W, Carbon, ±10%, 100K ohm
R_{542},R_{543}	1/2M-4.7KK	1/2W, Carbon, ±10%, 4.7K ohm

CAPACITORS

REF. NO.	PART NO.	DESCRIPTION
C_{1}, C_{5}	D-5-108F	50V, Discap, ±1%, 10 pfd
C_{2}, C_{16}	D-5-106P	50V, Discap, $^{+100}_{-\ 0}\%$, .001 mfd
C_{3}, C_{18}	D-5-205Z	50V, Discap, $^{+80}_{-20}\%$, .02 mfd
C_{4}, C_{17}	D-3-506P	30V, Discap, $^{+100}_{-\ 0}\%$, .005 mfd
C_{6}, C_{10}, C_{15}, C_{19}	D-5-105Z	50V, Discap, $^{+80}_{-20}\%$, .01 mfd
C_{7}	D-5-409C	50V, Discap, ±0.25 pfd, 4 pfd
C_{8}	T-5-207J	50V, Discap, ±5%, 200 pfd
C_{9}	D-5-508J	50V, Discap, ±5%, 50 pfd
C_{11}	D-5-309C	50V, Discap, ±0.25 pfd, 3 pfd
C_{12}	D-5-709D	50V, Discap, ±0.5 pfd, 7 pfd
C_{101}	D-5-158J	50V, Discap, ±5%, 15 pfd
C_{102}	T-5-377K	50V, Discap, ±10%, 370 pfd
C_{103}	ML-5-205M	50V, Mylar, ±20%, .02 mfd
C_{104},C_{125}	D-5-105Z	50V, Discap, $^{+80}_{-20}\%$, .01 mfd
C_{105},C_{108}, C_{111},C_{112}, C_{113},C_{114}, C_{122}	D-5-405Z	50V, Discap, $^{+80}_{-20}\%$, .04 mfd
C_{106},C_{118}, C_{123},C_{128}, C_{139}	D-5-205Z	50V, Discap, $^{+80}_{-20}\%$, .02 mfd
C_{107}	CU-1-103X	10V, Electrolytic, $^{+200}_{-\ 10}\%$, 1 mfd

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
C_{109}	D-5-109C	50V, Discap, ±0.25 pfd, 1 pfd
C_{115}, C_{116}	ML-5-206K	50V, Mylar, ±10%, .002 mfd
C_{117}	ML-5-306K	50V, Mylar, ±10%, .003 mfd
$C_{120}, C_{124}, C_{129}$	D-5-159C	50V, Discap, ±0.25 pfd, 1.5 pfd
C_{121}, C_{127}	D-3-506P	30V, Discap, $^{+100}_{-\ \ 0}\%$, .005 mfd
C_{125}	D-5-105	50V, Discap, %, .01 mfd
C_{126}	CU-03-102X	3V, Electrolytic, $^{+200}_{-\ 10}\%$, 10 mfd
C_{128}	T-5-207J	50V, Discap, ±5%, 200 pfd
C_{130}	D-5-609F	50V, Discap, ±1 pfd, 6 pfd
C_{132}, C_{133}	T-5-307J	50V, Discap, ±5%, 300 pfd
C_{134}	CU-06-102X	6V, Electrolytic, $^{+200}_{-\ 10}\%$, 10 mfd
C_{135}	D-5-207	50V, Discap, 200 pfd
C_{137}	ML-5-104M	50V, Mylar, ±20%, .1 mfd
C_{140}	D-5-109C	50V, Discap, ±0.25 pfd, 1 pfd
$C_{201}, C_{214}, C_{215}, C_{216}, C_{217}$	T-5-257K	50V, Discap, ±10%, 250 pfd
C_{202}, C_{203}	CU-1-102X	10V, Electrolytic, $^{+200}_{-\ 10}\%$, 10 mfd
C_{204}	ML-5-506K	50V, Mylar, ±10%, .005 mfd
C_{205}, C_{211}	S-5-104J	50V, Styrol, ±5%, .1 mfd
C_{206}	T-5-307J	50V, Discap, ±5%, 300 pfd
C_{207}, C_{208}	S-5-106J	50V, Styrol, ±5%, .001 mfd
C_{209}	D-5-105Z	50V, Discap, $^{+80}_{-20}\%$, .01 mfd
C_{210}	T-5-507J	50V, Discap, ±5%, 500 pfd
C_{212}	S-5-506J	50V, Styrol, ±5%, .005 mfd
C_{213}	CU-1-102X	10V, Electrolytic, $^{+200}_{-\ 10}\%$, 10 mfd
C_{218}, C_{219}	ML-5-106K	50V, Mylar, ±10%, .001 mfd
C_{220}, C_{221}	CU-06-102X	6V, Electrolytic, $^{+200}_{-\ 10}\%$, 10 mfd
C_{223}, C_{224}	CU-1-503X	10V, Electrolytic, $^{+200}_{-\ 10}\%$, 5 mfd
C_{301}, C_{302}	ML-5-206K	50V, Mylar, ±10%, .002 mfd
C_{303}, C_{304}	ML-5-105K	50V, Mylar, ±10%, .01 mfd
C_{305}, C_{306}	CU-1.5-103X	10V, Electrolytic, 1 mfd
$C_{307}, C_{308}, C_{325}, C_{326}$	CU-2.5-502R	25V, Electrolytic, $^{+150}_{-\ 10}\%$, 50 mfd
C_{309}, C_{310}	CU-06-302X	6V, Electrolytic, $^{+200}_{-\ 10}\%$, 30 mfd
C_{311}, C_{312}	CU-1-103X	10V, Electrolytic, $^{+200}_{-\ 10}\%$, 1 mfd
C_{313}, C_{314}	ML-5-205K	50V, Mylar, ±10%, .02 mfd
C_{315}, C_{316}	ML-5-204K	50V, Mylar, ±10%, .2 mfd
C_{317}, C_{318}	ML-5-306K	50V, Mylar, ±10%, .003 mfd
C_{319}, C_{320}	ML-5-305K	50V, Mylar, ±10%, .03 mfd
C_{321}, C_{322}	T-5-507K	50V, Discap, ±10%, 500 pfd
C_{323}, C_{324}	CU-15-103X	15V, Electrolytic, $^{+200}_{-\ 10}\%$, 1 mfd
C_{327}, C_{328}	CU-06-501X	6V, Electrolytic, $^{+200}_{-\ 10}\%$, 500 mfd
C_{329}, C_{330}	CU-2.5-101R	25V, Electrolytic, $^{+150}_{-\ 10}\%$, 100 mfd
C_{336}, C_{337}	T-5-257K	50V, Discap, ±10%, 250 pfd
C_{338}, C_{339}	CU-1.5-503X	15V, Electrolytic, $^{+200}_{-\ 10}\%$, 5 mfd
C_{340}, C_{343}	CU-1.5-102X	15V, Electrolytic, $^{+200}_{-\ 10}\%$, 10 mfd
C_{341}, C_{342}	T-5-207X	50V, Discap, $^{+200}_{-\ 10}\%$, 200 pfd
$C_{401}, C_{403}, C_{404}$	K-5-405Z	50V, Discap, $^{+80}_{-20}\%$, .04 mfd
C_{402}	CT-3.5-501R	35V, Electrolytic, $^{+150}_{-\ 10}\%$, 500 mfd
C_{501}, C_{502}	CT-2.5-101R	25V, Electrolytic, $^{+150}_{-\ 10}\%$, 100 mfd
C_{503}, C_{504}	CT-3.5-101R	35V, Electrolytic, $^{+150}_{-\ 10}\%$, 100 mfd
C_{505}, C_{506}	NP-2.5-303U	25V, Non Polar, $^{+250}_{-\ 10}\%$, 3 mfd
C_{507}, C_{508}	CT-2.5-100R	25V, Electrolytic, $^{+150}_{-\ 10}\%$, 1000mfd
C_{509}, C_{510}	ML-5-505M	50V, Mylar, ±20%, .05 mfd
C_{511}	D-5-509J	50V, Discap, ±5%, 5 pfd
C_{513}, C_{514}	T-5-307K	50V, Discap, ±10%, 300 pfd
C_{516}, C_{517}	PP-40-106M	400V, Tubular, ±20%, .001 mfd

COILS & TRANSFORMERS

L_1	8L-140A	Coil, FM Antenna
L_2	4L-515C	Coil, FM RF
L_3	4L-939	Coil, FM Choke
L_4	4L-336B	Coil, FM Osc.
L_{101}	7L-054B	Coil, AM Osc.
L_{121}	4L-933	Coil, FM Choke
L_{201}	4L-937	Coil, 67Kc Trap
L_{501}	4L-140A	Coil, AM Antenna
L_{502}	4L-138A	Coil, AM Tuning
T_1	4IF-768	Transformer, FM 1st IF
T_{101}	4IF-765	Transformer, AM 1st IF
T_{102}	4IF-766	Transformer, AM 2nd IF
T_{103}	4IF-767	Transformer, AM 3rd IF
T_{121}	4IF-769	Transformer, FM 2nd IF
T_{122}	4IF-770	Transformer, FM 3rd IF
T_{123}	4IF-771	Transformer, FM 4th IF
T_{201}	4L-936	Transformer, 19Kc Amp.
T_{202}	4L-935	Transformer, 19Kc Trap
T_{203}	4L-934	Transformer, 38Kc Det.
T_{301}, T_{302}	6T-414A	Transformer, Input
T_{501}	5T-518	Transformer, Power

SEMI-CONDUCTORS

D_1	SC-15	Diode, FM AFC
D_{101}	1N-60	Diode, AM AGC
D_{102}	1N-60	Diode, AM Detector
D_{121}	1N-60	Diode, FM Limiter
D_{122}	1N-60	Diode, FM AGC
D_{123}, D_{124}	1N-60	Diode, FM Detector
$D_{201}, D_{202}, D_{203}, D_{204}, D_{205}, D_{206}, D_{207}$	1N-34A	Diode, FM MPX
TH501, TH502, TH503, TH504	D-1A	Thermistor, AOC

COMPOUND CAPACITORS

M_{121}	PRC-332	1K ohm + .02 mfd
M_{122}	PRC-332	1K ohm + .02 mfd
M_{123}	PRC-306	1K ohm + .04 mfd
M_{501}, M_{502}	PRC-371	38Kc Filter

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION

CONTROLS

R V301	8V-587	50K ohm, Pot., Bass
R V302	8V-588	50K ohm, Pot., Balance with AFC Switch
R V303	8V-587	50K ohm, Pot., Treble
R V304	8V-589	50K ohm, Pot., Volume

MISCELLANEOUS

		Cabinet, Amp.
		Speaker Box
	PANEL-341	Panel
	8K-180	Knob, Tuning
		Knob, Volume, Balance
	8K-205	Selector, Bass, Treble, Off-On/Sleep
	U-BUTA -341A	Back Cover, Amp.
	U-BUTA -341B	Back Cover, Sp. Box
	SISIN-341	Pointer, Dial
	DIAL -341EX	Dial Plate
	S O-208	Socket, Pilot Lamp
	S O-906	Socket, Phono
	S O-106	Socket, Power Source
	S O-971	Socket Lecording
	S O-973	Socket, Player Power Source
	P G-106	Plug, Power Source
	P G-405	Plug, Player Power Source
	J -107	Jack, Recording
	J -219	Jack, Head Phone
	3 S-03	Switch, Band Selector
	8 S-55	Switch, Power
	HT-24K	Speaker, Phone Tweeter
	16 P-45 A	Speaker,
	RFU-207	P.C. Board RF (Complete)
	AFU-308	P.C. Board AF (Complete)
	FAD-105	P.C. Board MPX (Complete)
	FMT-528	P.C. Board FM Tuner (Complete)
	AC-UNIT -915	Chassis, Power Source (Complete)
	T-225	Terminal, FM Antenna
	T-405	Terminal, AF Output
	T-227	Terminal, AF Input
	PRU-161	Player Unit
	F H-102	Holder, Fuse
	P L-503	Lamp, Pilot
	P L-541	Lamp, Stereo Indicator
V C1, V C2, V C3, V C4, T C1, T C2, T C3, T C4	V C-165	Variable Tuning with Trimmer